CLAIMS

1. A trough for carrying molten metal, comprising:

(a) an outer shell defined by a bottom wall and two side walls;

(b) an insulating layer filling the outer shell;

(c) a conductive refractory trough body for carrying molten metal, embedded in the insulating layer; and

(d) a heating element positioned in the insulating layer, adjacent to but spaced apart from the trough body, to provide an air gap between the heating element and the trough body.

2. The trough of claim 1 wherein the air gap between the heating element and the trough body is at least 0.5 cm.

3. The trough of claim 1 wherein the air gap between the heating element and the trough body is less than 1.0 cm.

4. The trough of claim 1 wherein the heating element is positioned adjacent the bottom end of the trough.

5. The trough of claim 4 wherein heating elements are positioned adjacent side walls of trough.

6. The trough of claim 1 wherein the trough body is made of silicon carbide or graphite.

7. The trough of claim 1 further comprising a metal intrusion barrier means fitted to an outer surface of the trough body, adjacent the heating element.

8. The trough of claim 7 wherein the metal intrusion barrier means is made of a metal alloy or non-metal.

9. The trough of claim 7 wherein the metal alloy is an Fe-Ni-Cr alloy.

10. The trough of claim 7 wherein the non-metal is graphite.

11. The trough of claim 1 further comprising thermocouples placed in the heating element and in the trough body adjacent the molten metal and a P.I.D. closed loop control program for controlling heat output from the heating element.

12. The trough of claim 7 further comprising a conductivity detector connected with one connection to the metal intrusion barrier and with a second connection adapted for insertion in molten metal within the trough, the conductivity detector provided with a means to signal when the measured conductivity increases as a result of metal intrusion within the trough lining.

13. A method for heating molten metal being conveyed in a trough, said trough comprising an outer shell defined by a bottom wall and a pair of side walls, an insulating layer filling the outer shell, a conductive refractory trough body for carrying molten metal embedded in the insulating layer and a heating element positioned in the insulating layer, adjacent to but spaced apart from the trough body, to provide an air gap between the heating element and the trough,

the method comprising directing heat from the heater to the trough body by radiative heat transfer across the air gap and thereby providing uniform heating of the trough body and molten metal being conveyed therein.

14. The method of claim 13 wherein the distance across the air gap is 0.5 to 1.0 cm.

15. The method of claim 13 wherein the heating element is positioned adjacent the bottom end of the trough.

16. The method of claim 13 wherein heating elements are positioned adjacent side walls of the trough.

17. The method of claim 13 wherein the temperature of the heating element and the trough body adjacent the molten metal are measured and utilised for controlling heat output from the heating element.

18. The method of claim 13 wherein a metal intrusion barrier means is provided on an outer surface of the trough body adjacent the heating element and conductivity is measured between the intrusion barrier and the molten metal within the trough, with an increase in conductivity indicating metal infiltration into the trough lining.